BCI 3303 Oximeter

Clinician's Operation Manual

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BCI 3303 Clinician's Operation Manual

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Warranty & Service Information

Proprietary Notice

Information contained in this document is copyrighted by BCI International and may not be duplicated in full or part by any person without prior written approval of BCI International. Its' purpose is to provide the user with adequately detailed documentation to efficiently install, operate, maintain and order spare parts for the device supplied. Every effort has been made to keep the information contained in this document current and accurate as of the date of publication or revision. However, no guarantee is given or implied that the document is error free or that it is accurate regarding any specification.

Limited Warranty

BCI International warrants each new device to be free from defects in workmanship and materials under normal use and service for a period of two (2) years from the date of shipment, and reusable probes for a period one (1) year from shipment (domestic sales only). BCI International's sole obligation under this warranty will be to repair or replace, at its option, products that prove to be defective during the warranty period. The foregoing shall be the sole warranty remedy. Except as set forth herein, seller makes no warranties, either expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. No warranty is provided if the products are modified without the express written consent of BCI International, and seller shall not be liable in any event for incidental or consequential damage. This warranty is not assignable.

Loaner Device

BCI International will for the period of warranty make available at no charge, loaner devices if, in BCI International's opinion, the repair of the customer's device would require an unreasonable period of time.

Service Support

Repairs of BCI International's devices under warranty must be made at authorized repair centers. If the device needs repair, contact BCI International's service department to request a customer service report number (CSR). When calling, have the device's model and serial number ready.

NOTE! Shipments received without a CSR number will be returned to sender.

If you need to ship the device, pack the device and accessories carefully to prevent shipping damage. All accessories should accompany the device.

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CE Notice

Marking by the symbol CE indicates compliance of this device to the Electromagnetic Compatibility Directive 89/336/EEC of 3 May 1989, amended by 92/31/EEC of 28 April 1992 and 93/68/EEC, Article 5 of 22 July 1993. Such marking is indicative that this device meets or exceeds the following technical standards:

EN60601-1-2 (IEC 601-1-2) Medical Electrical Equipment - Part 1: General Requirements for Safety, 2: Collateral Standard: Electromagnetic Compatibility - Requirements and Tests.

Includes the following standards:

- Conformance to limit B and methods of EN55011 (emissions)
- Conformance to the levels and methods of IEC 801 or equivalent
- 801-2, ±4, 6, 8 kV air, 3 kV contact (ESD)
- 801-3, 3 V/m 26-1000 MHz (radiated immunity)
- 801-4, ±1 kV power leads (fast transient/burst)
- 801-5, ±2 kV CM, ±1 kV DM (surge)

A "Declaration of Conformity" in accordance with the above standards has been made and is on file at BCI International, Inc. A copy is included with every device.

Warnings, Cautions, & Notes

A *warning* tells you about something that could hurt the patient.

A *caution* tells you about something that could damage the monitor.

A *note* tells you other important information.

Warnings

WARNING! Federal law (USA) restricts the use or sale of this device by, or on the order of, a physician.

WARNING! Do not use this device in the presence of flammable anesthetics.

WARNING! Do not use this device in the presence of magnetic resonance imaging (MR or MRI) equipment.

WARNING: This device must be used in conjunction with clinical signs and symptoms. This device is only intended to be an adjunct in patient assessment.

WARNING! Prolonged use or the patient's condition may require changing the sensor site periodically. Change sensor site and check skin integrity, circulatory status, and correct alignment at least every 4 hours.

WARNING! When attaching probes with Microfoam®[1] tape, do not stretch the tape or attach the tape too tightly. Tape applied too tightly may cause inaccurate readings and blisters on the patient's skin (lack of skin respiration, not heat, causes the blisters).

WARNING! Connect the AC power cord to grounded, three-wire outlet. Failure to comply may compromise patient isolation.

WARNING! In the event that earth ground integrity is lost, the performance of this device and or other devices nearby may be affected due to excessive RF emissions.

[1] Microfoam® is a registered trademark of the 3M Company.

Cautions

CAUTION! The monitor is equipped with an internal rechargeable battery. Do not attempt to remove or replace the internal rechargeable battery. Refer servicing to an authorized repair center.

CAUTION! Do not autoclave, ethylene oxide sterilize, or immerse the probes in liquid.

CAUTION! This device is intended for use by persons trained in professional health care. The operator must be thoroughly familiar with the information in this manual before using the device.

CAUTION! Connect only the printer cable specifically intended for use with this device (see *Optional Supplies and Accessories).*

CAUTION! Failure to charge the monitor while the monitor is not being used may shorten the battery life. Charge the monitor while the monitor is not being used to ensure the longest battery life.

CAUTION! Do not attempt to stand the Oximeter upright when not using the Protective Rubber Boot. Position Oximeter on back surface.

Notes

NOTE! Operation of this device may be adversely affected in the presence of strong electromagnetic sources, such as electrosurgery equipment.

NOTE! Operation of this device may be adversely affected in the presence of computed tomograph (CT) equipment.

NOTE! Use only SpO_2 probes supplied with, or specifically intended for use with, this device.

NOTE! SpO_2 measurements may be adversely affected in the presence of high ambient light. Shield the probe area (with a surgical towel, for example) if necessary.

NOTE! Dyes introduced into the bloodstream, such as methylene blue, indocyanine green, indigo carmine, and fluorescein, may adversely affect the accuracy of the SpO_2 reading.

NOTE! Any condition that restricts blood flow, such as use of a blood pressure cuff or extremes in systemic vascular resistance, may cause an inability to determine accurate pulse rate and SpO_2 readings.

NOTE! Remove fingernail polish or false fingernails before applying SpO_2 probes. Fingernail polish or false fingernails may cause inaccurate SpO_2 readings.

Chapter 1: Introduction

This chapter is divided into the following sections:

- About the Manuals
- Theory of Operation
- Monitor Features

About the Manuals

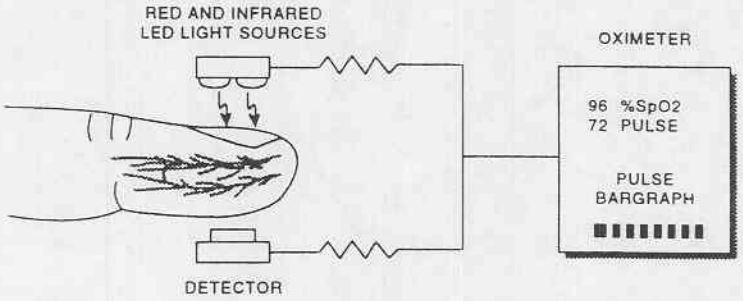
The Clinician's Operation Manual provides installation, operation, and maintenance instructions for the health-care professional trained in monitoring respiratory and cardiovascular activity.

The Home-Use Instruction Book provides operation and maintenance instructions for the home-use caregiver. The home-use caregiver is assumed to be trained in oximeter use by a doctor or other health-care professional. The Home-Use Instruction Book supplements, and does not replace, training provided by a health-care professional in oximeter use.

Theory of Operation

The oximeter determines SpO_2 and pulse rate by passing two wavelengths of light, one red and one infrared, through body tissue to a photodetector. During measurement, the signal strength resulting from each light source depends on the color and thickness of the body tissue, the probe placement, the intensity of the light sources, and the absorption of the arterial and venous blood (including the time varying effects of the pulse) in the body tissues.

Figure 1.1: SpO_2 Theory Of Operation



The oximeter processes these signals, separating the time invariant parameters (tissue thickness, skin color, light intensity, and venous blood) from the time variant parameters (arterial volume and SpO_2) to identify the pulse rate and calculate oxygen saturation. Oxygen saturation calculations can be performed because oxygen saturated blood predictably absorbs less red light than oxygen depleted blood.

Chapter 2: Intended Use and Monitor Features

Intended Use

The 3303 Oximeter provides fast, reliable SpO_2, pulse rate, and pulse strength measurements . It may be used in the hospital or clinical environment, during emergency air or land transport, or for in-home use. The oximeter will operate accurately over an ambient temperature range of 32 to 104° F (0 to 40° C). The oximeter works with all BCI oximetry probes providing SpO_2 and pulse rate on all patients from neonate to adult (see section *Choosing the Probe* under *Attaching the Probe to the Patient*).

The oximeter permits patient monitoring with adjustable alarm limits as well as visible and audible alarm signals. The oximeter has three modes of operation: Clinician Mode, Home-Use Mode, and Sleep Study Mode. Clinician Mode aids the health care professional in monitoring patient activity. The Home Use Mode permits the home-use caregiver to monitor a patient within the home environment. Finally, Sleep Study Mode allows the health care professional to record sleep study data which may later be transferred to a PC and analyzed.

Monitor Features

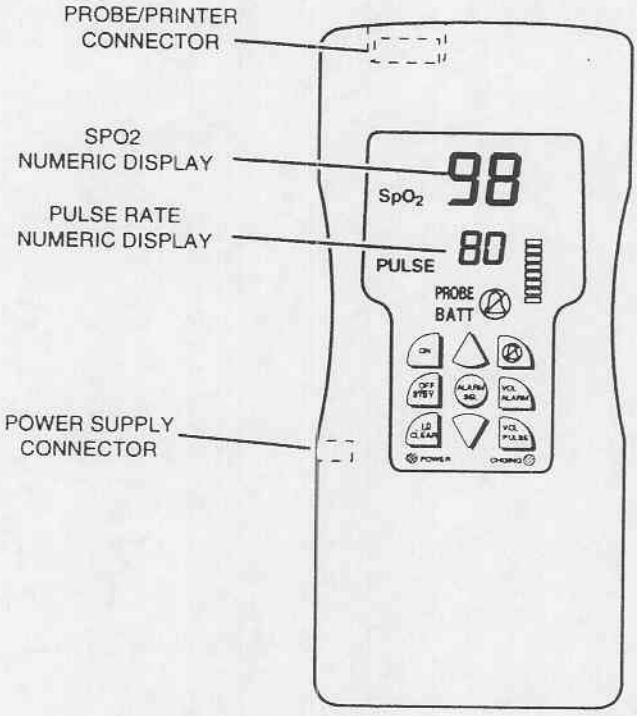
- Provides fast, reliable SpO_2, pulse rate, and pulse strength measurements on any patient, from neonates to adults.
- Ideally suited for use in intensive care units, outpatient clinics, emergency rooms, during emergency air or land transport, or for in-home use.
- Portable and lightweight. Weighs only 19 ounces (539 grams).
- Ergonomically designed to fit comfortably in the palm of your hand.
- Uses an internal, rechargeable battery.
- Battery life is approximately 24 hours in continuous use. Battery fully charges in about 6 hours.
- Bright, easy-to-read LED displays indicate SpO_2 and pulse rate measurements. Brightness is user-adjustable.
- An eight-segment LED bar graph indicates pulse strength.

- Positive identification of SpO_2 or pulse rate alarm. Adjustable high and low alarm limits for SpO_2 and pulse rate measurements.
- Adjustable volume (including off) alarm and alert tones.
- Adjustable volume (including off) "beep" sounds with each pulse beat. Pitch of pulse "beep" corresponds to SpO_2 value.
- Low battery indicator lights when about 30 minutes of battery use remains.
- Connects to an optional external printer. Prints less than 15 minutes of trend data in a tabular format, or more than 15 minutes of trend data in a graphic format.
- SpO_2 and pulse rate averaging settings are user-selectable.
- Trend view allows operator to view previous patient history.
- Home-use mode allows a home-use caregiver to monitor a patient at home.
- Sleep study mode allows the health care professional to record the SpO_2 and Heart Rate values of a patient every 4 seconds for up to 12 hours.
- Sleep study mode allows the health care professional to output the data to a PC for further analysis.

Chapter 3: Controls & Features

Monitor Front Panel

Figure 3.1: Monitor Front Panel



Probe/Printer Connector

The probe connects here, or an oximetry cable can be connected between the monitor and the probe. The printer is also connected here.

SpO_2 Numeric Display

A number shows the patient's SpO_2 value in percent. Dashes (- - -) mean the monitor is not able to calculate the SpO_2 value.

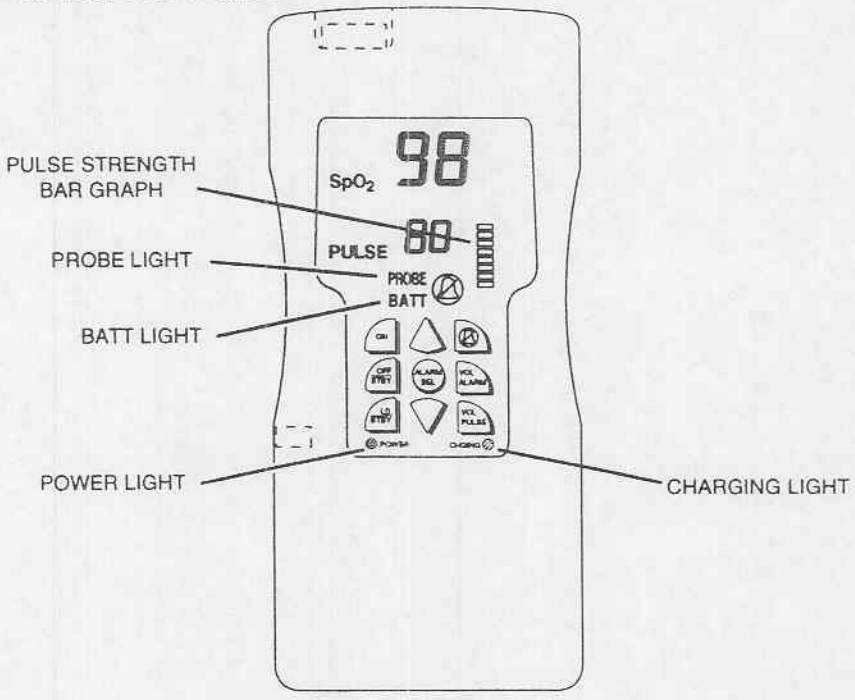
Pulse Rate Numeric Display

A number shows the patient's pulse rate value in beats per minute. Dashes (- - -) mean the monitor is not able to calculate the pulse rate value.

Power Supply Connector

The AC power supply connects here.

Figure 3.2: Monitor Front Panel



Pulse Strength Bar Graph

The pulse strength bar graph "sweeps" with the patient's pulse beat. The height of the bar graph tells the strength of the patient's pulse.

Probe Light

PROBE flashes on and off when the probe is not connected to the monitor, the probe is not attached to the patient, or the probe is not properly attached to the patient.

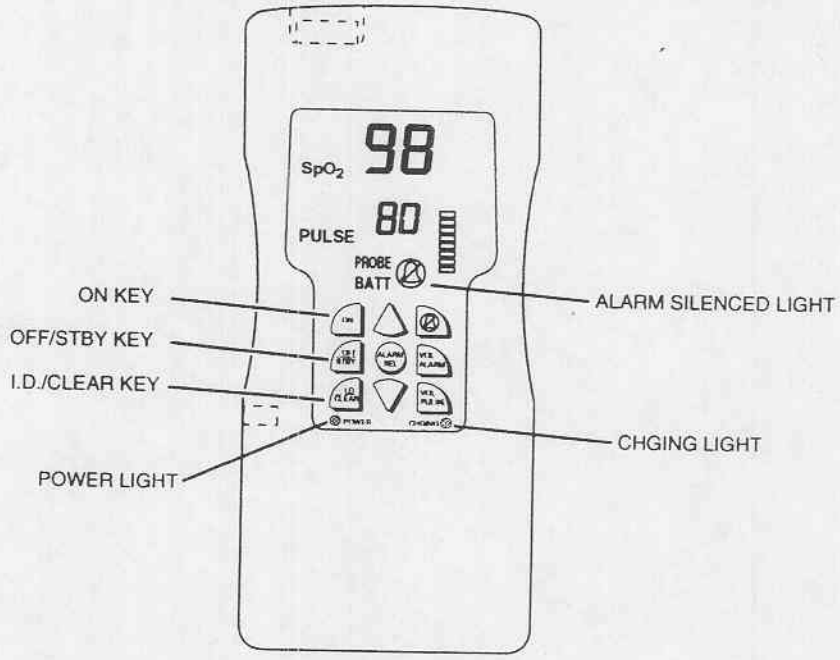
⚠ **WARNING! While PROBE is flashing, the monitor cannot measure the patient's SpO_2 or pulse rate. You must immediately check the patient's condition. After you have checked the patient's condition, you must correct the PROBE alert.**

BATT Light

BATT flashes on and off when about 30 minutes of battery use remains. The monitor will work until the battery becomes very weak. When the battery becomes very weak, the monitor will turn itself off.

⚠ **WARNING! When BATT flashes, you must immediately charge the monitor's battery. Otherwise, the monitor turns itself off about 30 minutes after BATT begins to flash.**

Figure 3.3: Monitor Front Panel



POWER Light

The POWER light is green when the power supply is attached.

CHGING Light

The CHGING light is yellow when the battery is fast charging.

Alarm Silenced Light

The alarm silenced light flashes on and off when the alarm and alert tones are silenced for two minutes. The alarm silenced light remains on when the alarm and alert tones are silenced indefinitely (until canceled or until the monitor is turned off).

On Key

Pressing ON turns on the monitor.

Off/Stby Key

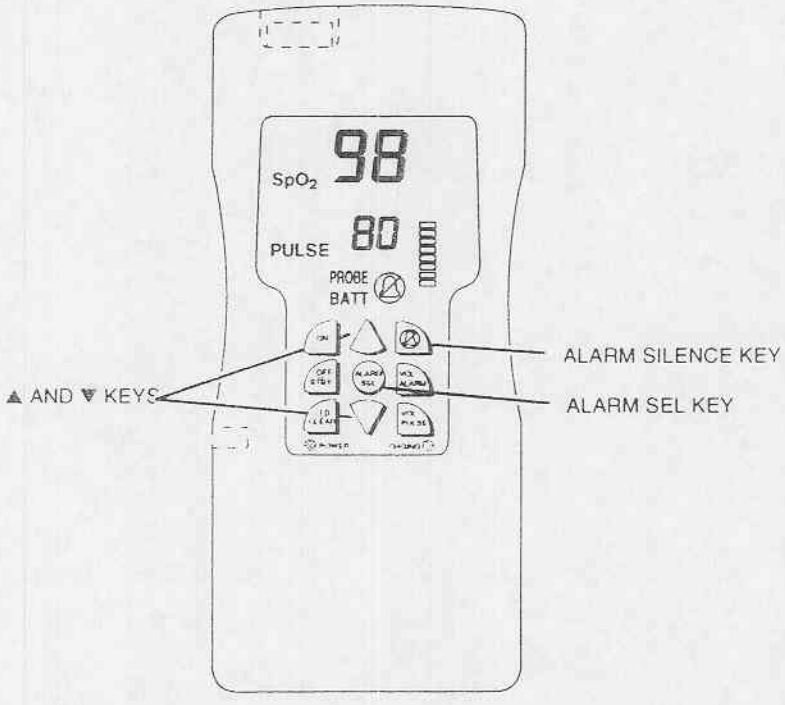
Pressing OFF/STBY turns off the monitor.

I.D./Clear Key

While the probe is connected to the monitor: Pressing I.D./CLEAR increases the patient number by one; the patient number is briefly displayed in the SpO_2 digits. Pressing and holding I.D./CLEAR for about six seconds clears all trend data and sets the patient number to 1.

While the probe is not connected to the monitor: Pressing I.D./CLEAR causes the monitor to enter the trend view mode (two bar graph segments flash to indicate trend view mode.) During trend view mode, the last valid measurement for each patient number can be shown by pressing the ▲ or ▼ keys. The display shows Pn (n = patient number) then the measurement corresponding to that patient number. If, after 20 seconds, no keys are pressed, the monitor exits the trend view mode.

Figure 3.4: Monitor Front Panel



▲ and ▼ Keys

The ▲ and ▼ keys are used to adjust up and down the following settings: brightness of the display; alarm limits; trend view patient numbers; SpO_2 and pulse rate averaging.

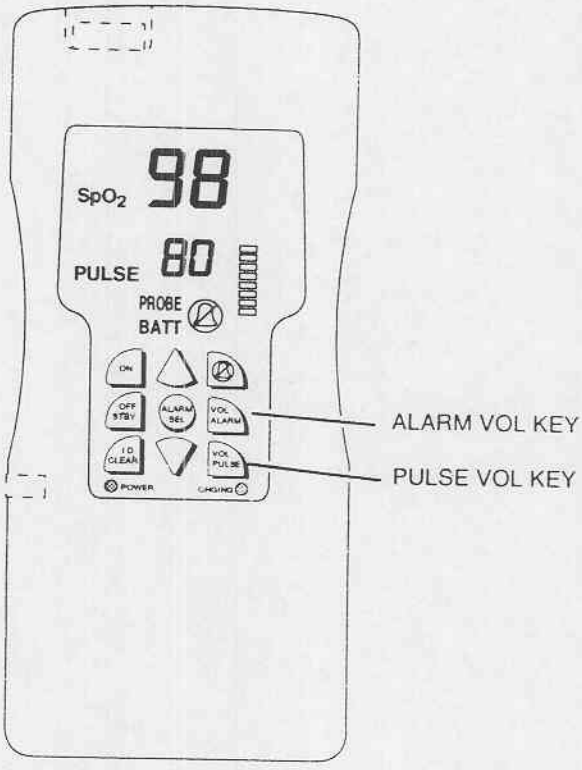
Alarm Silence Key

Momentarily pressing the alarm silence key silences the alarm tone for two minutes. Pressing and holding the alarm silence key for about three seconds silences the alarm tone indefinitely (until canceled or until the monitor is turned off).

Alarm Sel Key

Pressing ALARM SEL cycles through each of the alarm limits for setting.

Figure 3.5: Monitor Front Panel



Alarm Vol Key

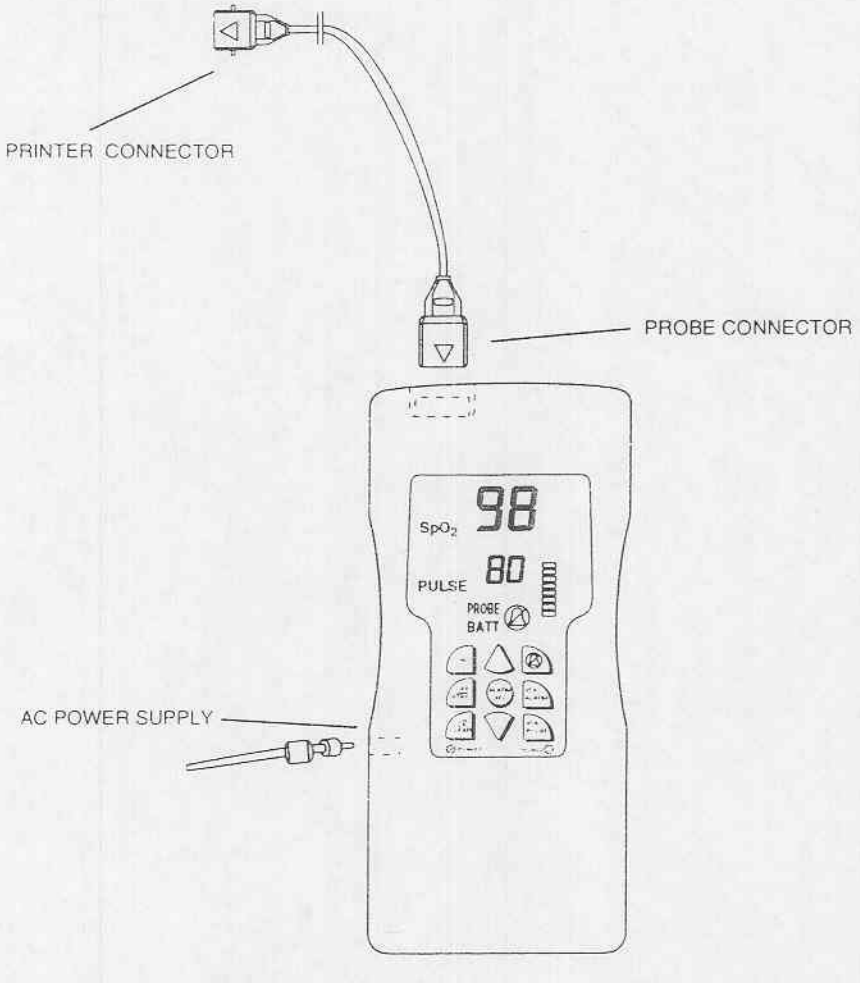
Pressing ALARM VOL key changes the alarm volume from soft to loud or loud to soft.

Pulse Vol Key

Pressing the PULSE VOL key changes the pulse "beep" volume.

NOTE! The pulse volume is stored after the monitor is turned off.

Figure 3.6: Connectors



AC Power Supply

AC power supply connects here.

Probe/Printer Connector

An optional printer can be connected for printing trend data. See *Printer* section for more printer options.

Chapter 4: Operating Instructions

This chapter is divided into the following sections:

- Unpacking the Monitor
- Attaching the Probe to the Patient
- Turning On the Monitor
- Alarms
- Alerts
- Turning Off the Monitor
- Checking the Monitor's Performance

Unpacking the Monitor

1. Carefully remove the monitor and its accessories from the shipping carton. Save the packing materials in case the monitor must be shipped or stored.

2. Compare the packing list with the supplies and equipment you received to make sure you have everything you'll need.

Attaching the probe to the Patient

What you need to know about attaching the probe to the patient:

⚠ **WARNING! Prolonged use or the patient's condition may require changing the sensor site periodically. Change sensor site and check skin integrity, circulatory status, and correct alignment at least every 4 hours.**

⚠ **WARNING! When attaching probes with Microfoam® tape, do not stretch the tape or attach the tape too tightly. Tape applied too tightly may cause inaccurate readings and blisters on the patient's skin (lack of skin respiration, not heat, causes the blisters).**

Attaching the patient to the monitor requires these steps:

1. Choose the probe.
2. Check the probe and oximetry cable.
3. Clean or disinfect the probe if using the reusable type. (Disposable probes are for single-patient use and do not require cleaning or disinfecting.)
4. Attach the probe to the patient.

Choosing the Probe

Choose the appropriate probe from the following chart.

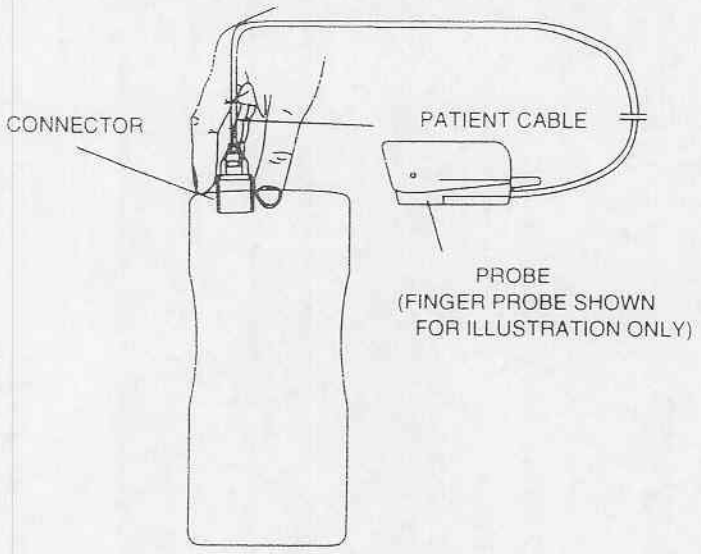
PATIENT	SITE	DESCRIPTION	PAGE
Adult > 45 Kg	Finger	3044: Probe, Adult (reusable)	4-8
		3043: Probe, Universal "Y" (reusable)	4-10
	Finger or Toe	1300: Probe, Disposable, Adult Finger	4-9
	Ear	3078: Probe, Ear (reusable)	4-12
Pediatric 15-45 Kg	Finger	3044: Probe, Adult (reusable)	4-8
		3043: Probe, Universal "Y" (reusable)	4-10
	Finger or Toe	1301: Probe, Disposable, Ped. Finger	4-9
	Ear	3078: Probe, Ear (reusable)	4-12
Infant 3-15 Kg	Hand or Foot	3043: Probe, Universal "Y" (reusable)	4-10
	Toe	3025: Probe, Wrap, Infant (reusable)	4-13
	Finger or Toe	1303: Probe, Disposable, Infant	4-13
Neonate < 3 Kg	Hand or Foot	1302: Probe, Disposable, Neonate	4-14
	Foot	3026: Probe, Wrap, Neonate (reusable)	4-14

Care and Handling of the Probe

⚠ **WARNING! Misuse or improper handling of the probe and cable could result in damaging of the probe. This may cause inaccurate readings.**

Hold the connector rather than the cable when connecting or disconnecting the finger probe to the device as shown in Figure 4.1.

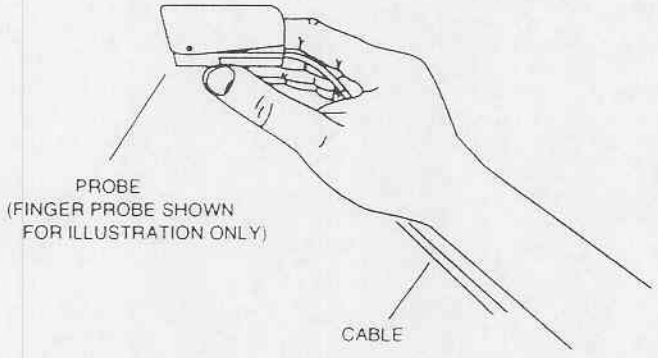
Figure 4.1: Disconnecting or connecting the finger probe.



Do not use excessive force or unnecessary twisting when connecting, disconnecting, storing, or when using the probe.

When placing the probe on the patient, allow the cable to lay across the palm of the hand and parallel to the arm of the patient as shown in Figure 4.2.

Figure 4.2: Positioning the cable of the finger probe.



Upon completion of patient monitoring, detach the probe as shown in Figure 4.1 and loosely coil the finger probe cable.

Checking the Probe and Oximetry Cable

Follow these instructions each time before you attach the probe to the patient. This helps ensure the probe and oximetry cable are working properly.

⚠ **WARNING! Using a damaged probe may cause inaccurate readings. Inspect each probe. If a probe appears damaged, do**

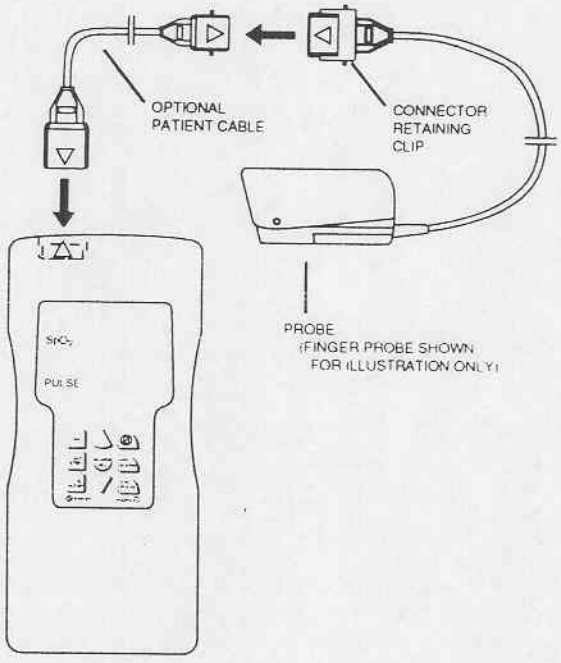
not use it. Use another probe or contact your authorized repair center for help.

⚠ **WARNING! Using a damaged oximetry cable may cause inaccurate readings. Inspect the oximetry cable. If the oximetry cable appears damaged, do not use it. Contact your authorized repair center for help.**

1. Carefully inspect the probe to make sure it does not appear damaged.

2. If using the oximetry cable, carefully inspect the oximetry cable to make sure it does not appear damaged.

Figure 4.3: Attaching Probe And Oximetry Cable To Monitor.

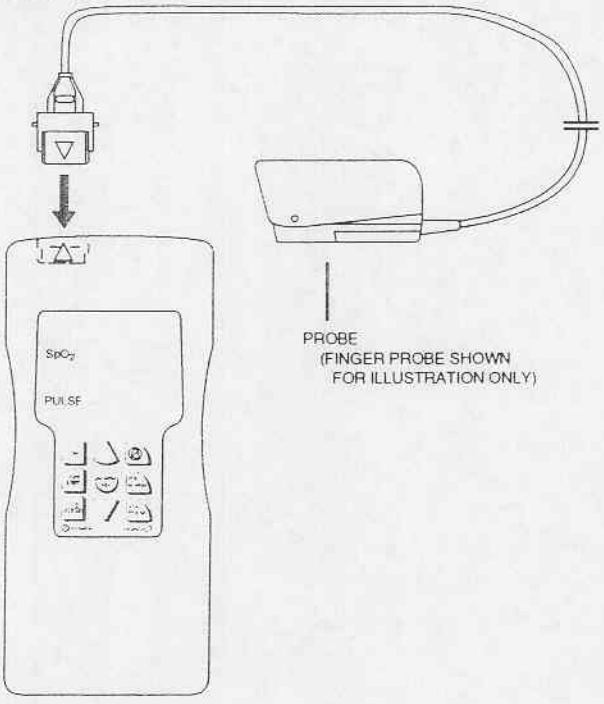


3. If using the oximetry cable:

   a. If the probe is not already connected to the oximetry cable, connect the probe to the oximetry cable as shown. Push the connectors together firmly and close the latch to secure the connectors.

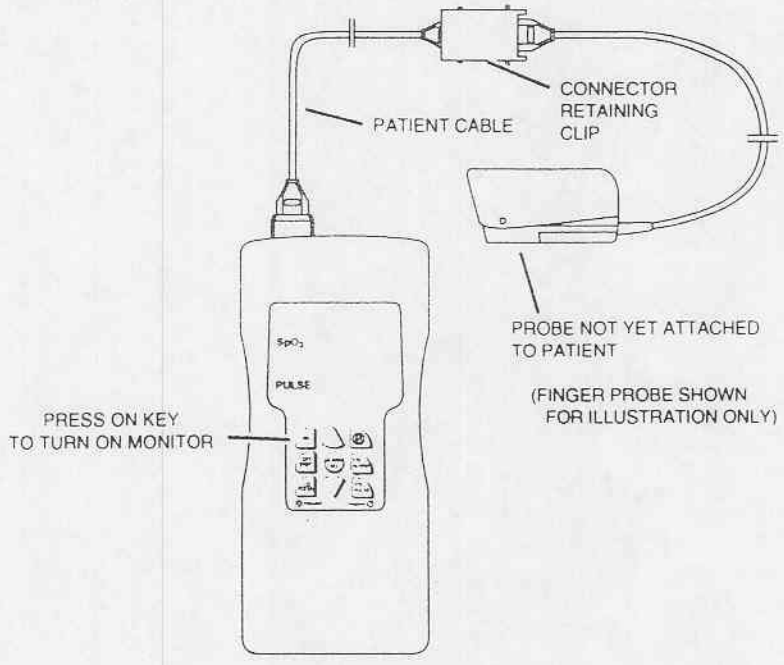
   b. If the oximetry cable is not already connected to the monitor, connect the oximetry cable to the monitor as shown. Push the connector firmly into the monitor.

Figure 4.4: Attaching Probe To Monitor.



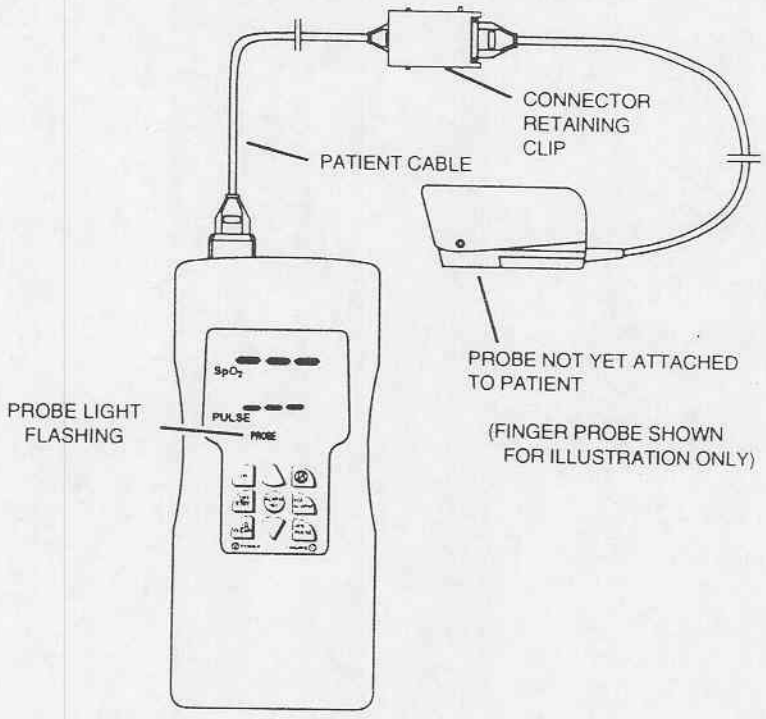
4. If not using the oximetry cable: Connect the probe to the monitor as shown. Push the connector firmly into the monitor.

Figure 4.5: Turning On The Monitor.



5. If the monitor is not already on, press the ON key to turn on the monitor.

Figure 4.6: Checking Integrity Of Probe, Oximetry Cable, And Oximeter.



⚠ **WARNING! If any of the integrity checks fail, do not attempt to monitor the patient. Use another probe or oximetry cable, or contact the equipment dealer for help if necessary.**

6. Before the probe is attached to the patient, check the integrity of the probe, oximetry cable, and oximeter as follows:

   a. Make sure the red light in the probe is illuminated.

   b. Make sure the PROBE indicator is flashing as follows:

      NOTE! Obstructions or dirt on the probe's red light or detector may cause the checks to fail. Make sure there are no obstructions and the probe is clean.

      - For "Y" probes, wrap probes, and disposable probes: Align the probe's red light with the detector so they are less than 1/8 inch away from each other. Make sure the PROBE indicator is flashing on the oximeter.
      - For the finger probe and ear probe: Make sure the PROBE indicator is flashing on the oximeter.

7. You are now ready to attach the probe to the patient.

Cleaning or Disinfecting the Probes

Clean or disinfect reusable probes before attaching to a new patient.

WARNING! Do not autoclave, ethylene oxide sterilize, or immerse the probes in liquid.

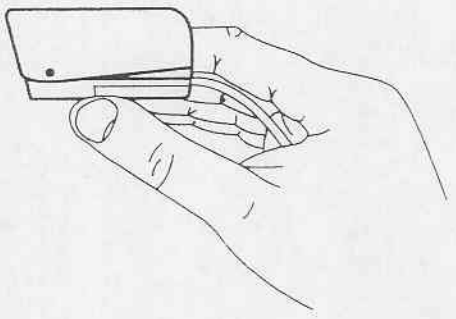
CAUTION! Unplug the probe from the monitor before cleaning or disinfecting.

Clean the probe with a soft cloth moistened in water or a mild soap solution. To disinfect the probe, wipe the probe with isopropyl alcohol.

Finger Probe for Adult or Pediatric Finger

Attach the finger probe to the patient as shown. Be sure to fully insert the patient's finger into the probe. For patients with long fingernails, use the universal "Y" probe.

Figure 4.7: Attaching The Finger Probe



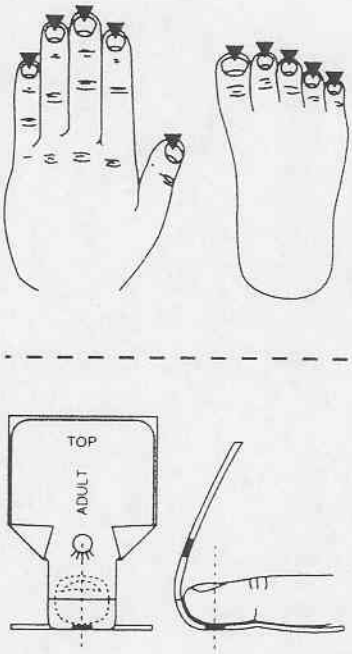
Disposable Probe for Adult Finger or Toe

Disposable Probe for Pediatric Finger or Toe

Choose an application site on the patient's finger or toe where the light source will be directly over and in-line with the detector. The preferred sites are the forefinger or the thumb.

Place the patient's digit in the probe nail-side up, lining up the digit's pad over the detector. The probe's positioning line runs across the fingertip.

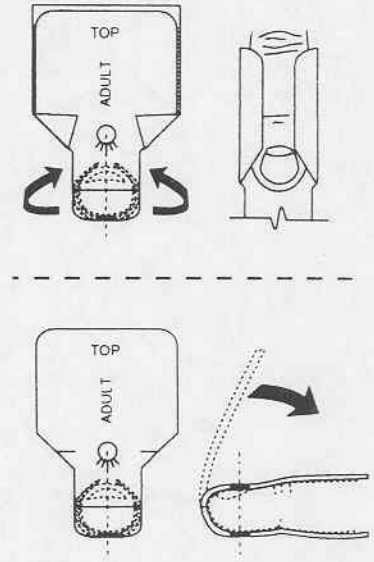
Figure 4.8: Position The Digit In The Probe



Wrap the bottom adhesive around the digit, being careful not to cover the nail.

Fold the probe's top over the digit, making sure the light source is directly over and in-line with the detector. Wrap the adhesive around the finger or toe to secure the probe. Route the cable along the palm or the bottom of the foot, and secure with adhesive tape if necessary.

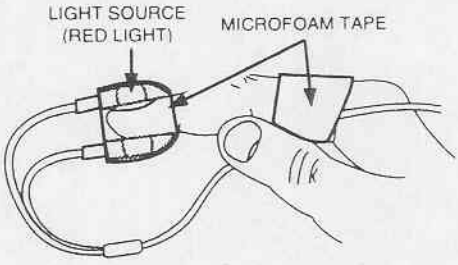
Figure 4.9: Wrap The Adhesive Around The Digit



Universal "Y" Probe for Adult or Pediatric Finger

Attach the probe to the patient with the light source to the fingernail. Line up the light source with the detector, so the source and detector are in-line. Secure the probe and cable with Microfoam® tape, being careful not to over-tighten the tape.

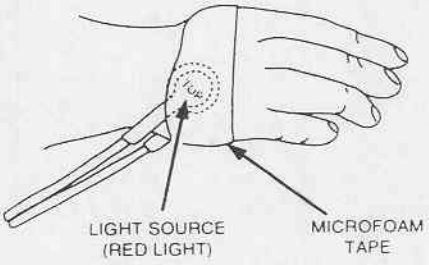
Figure 4.10: Adult Or Pediatric Finger Universal "Y" Probe Attachment



Universal "Y" Probe for Infant Hand

Attach the Universal Y probe to a fleshy portion of the infant's hand. Attach the probe with the light source on the outside or top of the hand to keep the detector away from ambient light. Line up the light source with the detector, so the source and detector are in-line. Secure the probe with Microfoam® tape, being careful not to over-tighten the tape.

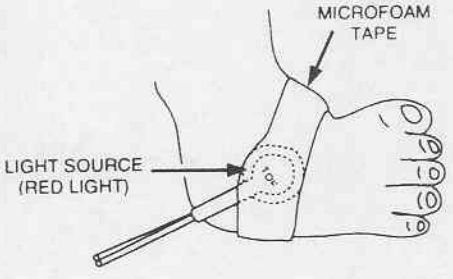
Figure 4.11: Infant Hand Universal "Y" Probe Attachment



Universal "Y" Probe for Infant Foot

Attach the probe to a fleshy portion of the infant's foot. Attach the probe with the light source on the outside or top of the foot to keep the detector away from ambient light. Line up the light source with the detector, so the source and detector are in-line. Secure the probe with Microfoam® tape, being careful not to over-tighten the tape.

Figure 4.12: Infant Foot Universal "Y" Probe Attachment



Universal "Y" Probe Paper Patient Attachment

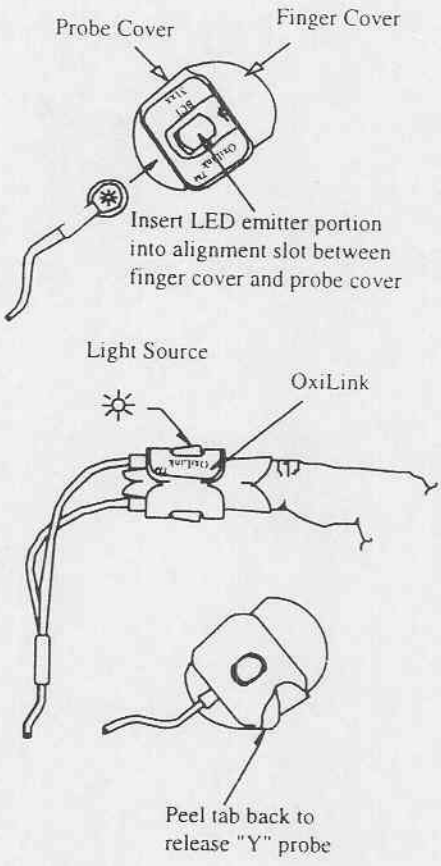
With label side "up", insert the LED emitter portion of the probe (labeled ✸) between the short and long portion of the attachment. Verify that the label ✸ is visible through the hole.

Repeat this process with the "Y" probe's photodetector on the opposite side of the attachment. Insure the top of the solid rubber portion of the probe is visible through the hole.

Position the "Y" probe patient attachment with the light source ✸ side to the fingernail.

Grasp the attachment between your thumb and forefinger along the creased side and gently pinch the sides of the attachment and place it on the patient's finger. Insert the attachment so that the light source and photodetector are positioned on the tip of the finger. Inserting the finger in the attachment too far may affect the performance of the probe and patient attachment

Figure 4.13: OxiLink

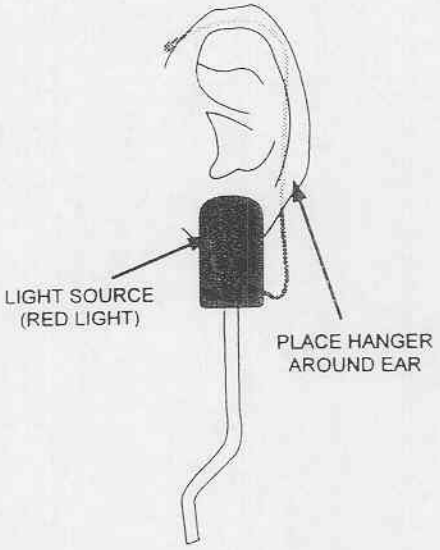

Probe Cover
Finger Cover
Insert LED emitter portion into alignment slot between finger cover and probe cover
Light Source
OxiLink
Peel tab back to release "Y" probe

Earprobe for Adult or Pediatric Ear

Rub the patient's earlobe with an alcohol prep for 1-2 minutes.

Attach the ear probe to a fleshy portion of the earlobe. Make sure the light source is on the outside of the ear, and the hanger is behind the ear. Place hanger around the ear.

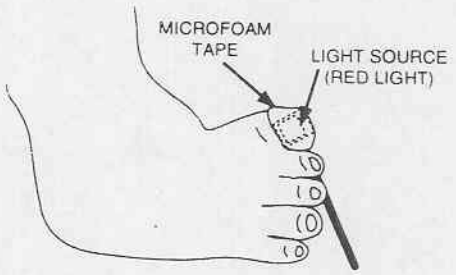
Figure 4.14: Earprobe For Adult Or Pediatric Ear



Wrap Probe for Infant Toe

Attach the infant wrap probe with the light source to the toenail. Attach the probe with the light source on the outside or top of the foot to keep the detector away from ambient light. Line up the light source with the detector, so the source and detector are in-line. Secure the probe with Microfoam® tape, being careful not to over-tighten the tape.

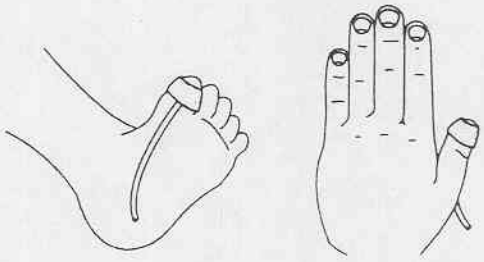
Figure 4.15: Wrap Probe For Infant Toe



Disposable Probe for Infant Finger or Toe

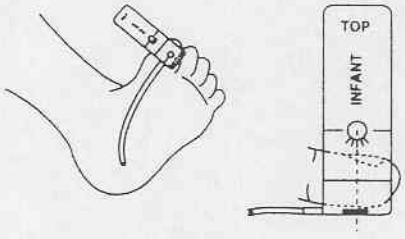
Choose an application site on the patient's hand or foot. The preferred site is the infant's great toe. Alternatively, the thumb or another large digit can be used.

Figure 4.16: Choose An Application Site



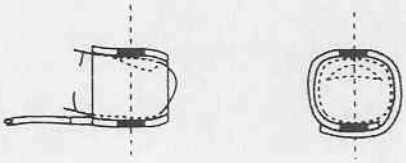
Place the probe on the infant's digit. Position the detector on the digit's pad and line-up the light source with the detector.

Figure 4.17: Position The Digit In The Probe



Wrap the adhesive around the digit. Be sure to line-up the light source with the detector as shown. Secure the cable to the foot or hand using adhesive tape if necessary.

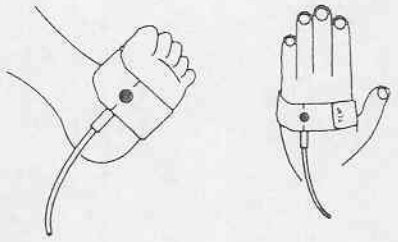
Figure 4.18: Wrap The Adhesive Around The Digit



Disposable Probe for Neonate Hand or Foot

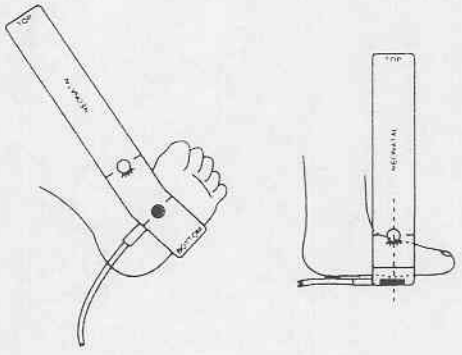
Choose an application site on the patient's foot or hand. The preferred site is the ball of the foot. Alternatively, the heel of the hand can be used.

Figure 4.19: Choose An Application Site



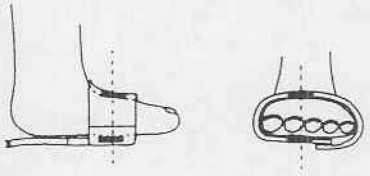
Position the detector on the sole of the foot or heel of the hand. Route the cable towards the heel or wrist. Line-up the light source with the detector.

Figure 4.20: Position The Probe



Wrap the adhesive around the foot or hand. Be sure to line-up the light source with the detector as shown. Secure the cable to the foot or hand using adhesive tape if necessary.

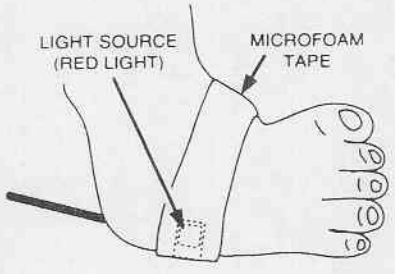
Figure 4.21: Wrap The Adhesive



Wrap Probe for Neonate Foot

Attach the neonatal wrap probe to a fleshy portion of the foot. Attach the probe with the light source on the outside or top of the foot to keep the detector away from ambient light. Line up the light source with the detector, so the source and detector are in-line. Secure the probe with Microfoam® tape, being careful not to over-tighten the tape.

Figure 4.22: Wrap Probe For Neonate Foot

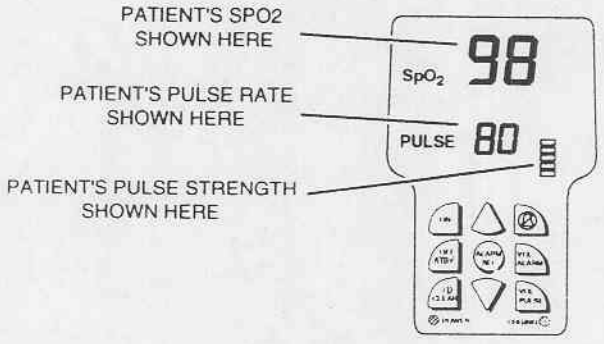


Turning On the Monitor

1. To turn on the monitor, press the ON key. When turned on, the monitor does the following:

   - The pulse strength bar graph segments light one at a time.
   - The monitor's software revision is momentarily displayed.
   - The patient number is momentarily displayed.
   - The monitor is in Clinician Mode.

Figure 4.23: SpO_2, Pulse Rate, And Pulse Strength Bar Graph.



2. After a few seconds the % SpO_2 value, pulse rate, and pulse strength bar graph should be shown. If not, see the *Troubleshooting* section for help.

3. The monitor has available three averaging settings for SpO_2 and pulse. To change the averaging setting, press and hold the ▼ arrow key while turning on the monitor. While holding the ▼ key, press the ▲ key to scroll through the following averaging selections:

SPO_2 AVERAGING	PULSE AVERAGING
4	8
8	8
16	8
16	16

NOTE! SpO_2 averaging is the number of pulse beats over which the SpO_2 value is averaged; pulse averaging is the number of seconds over which the pulse value is averaged.

Alarms

Alarms warn you about an abnormal patient condition.

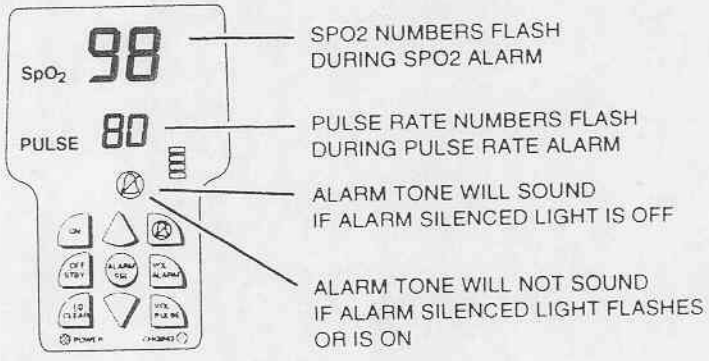
An alarm turns on when:

- the patient's SpO_2 reading matches or exceeds the SpO_2 alarm range.

or

- the patient's pulse rate reading matches or exceeds the pulse rate alarm range.

Figure 4.24: Alarm Example



During an alarm:

- the numbers flash that correspond to the alarm.
- the alarm tone sounds, if not silenced. The alarm tone sounds like a siren: dee, doo, dee, doo.

NOTE! Both the SpO_2 and pulse rate numbers will flash if both readings match or go beyond their alarm range.

Alerts

An alert warns you about an abnormal monitor condition.

An alert turns on when:

- the probe is not connected to the monitor.

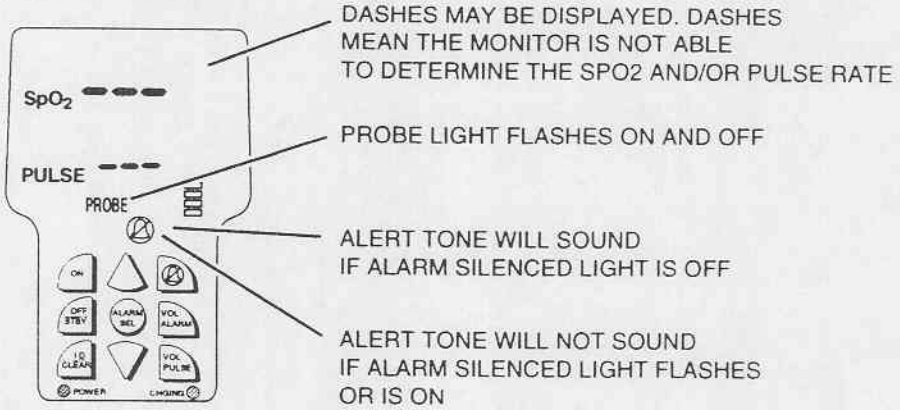
or

- the probe is not attached to the patient.

or

- the probe is not properly attached to the patient.

Figure 4.25: Alert Example


DASHES MAY BE DISPLAYED. DASHES MEAN THE MONITOR IS NOT ABLE TO DETERMINE THE SPO2 AND/OR PULSE RATE
PROBE LIGHT FLASHES ON AND OFF
ALERT TONE WILL SOUND IF ALARM SILENCED LIGHT IS OFF
ALERT TONE WILL NOT SOUND IF ALARM SILENCED LIGHT FLASHES OR IS ON
SpO2
PULSE
PROBE

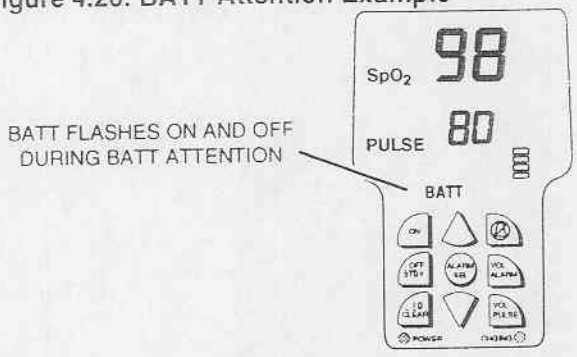
During an alert:

- the PROBE light flashes.
- the alert tone sounds, if not silenced. The alert tone is a single-tone sound with a pause: beep beep, pause, beep beep.

WARNING! While PROBE is flashing, the monitor cannot measure the patient's SpO_2 or pulse rate. You must immediately check the patient's condition. After you have checked the patient's condition, you must correct the PROBE alert. See *Correcting the PROBE Alert* in the *Maintenance* section for help.

BATT Attention

Figure 4.26: BATT Attention Example



During the BATT attention:

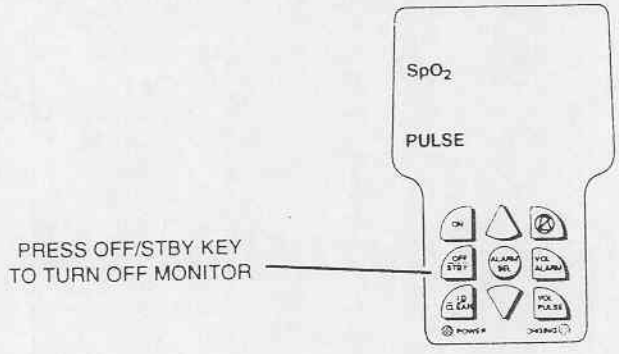
- a short burst of beeps sounds every 30 seconds.
- the BATT light flashes on and off.

WARNING! When BATT flashes, you must immediately charge the monitor's battery. Otherwise, the monitor turns itself off about 30 minutes after BATT begins to flash. See *BATT attention* in the *Troubleshooting* section for help.

Turning Off the Monitor

Turn off the monitor when you are not monitoring a patient.

Figure 4.27: Turning Off The Monitor



To turn off the monitor, press the OFF/STBY key.

Checking the Monitor's Performance

Pulse oximeters do not require user calibration. If checking the function of the device is desired, an optional Oximeter/ECG Patient Simulator (BCI catalog number 1606) is available as an accessory. The simulator attaches to the oximeter in place of the probe or oximetry cable. It provides a known SpO_2 and pulse rate signal to the oximeter. This allows the oximeter's performance to be checked.

NOTE! The 1606 Oximeter/ECG Patient Simulator does not calibrate the monitor; the monitor does not require calibration. The 1606 provides a known SpO_2 and pulse rate to the monitor that allows you to check the monitor's performance.

NOTE! Follow the instructions included with the Oximeter/ECG Patient Simulator.

Chapter 5: Changing the Monitor's Settings

This chapter is divided into the following sections:

- Silencing Alarm and Alert Tones
- Changing the Alarm and Alert Tone Volume
- Adjusting the Brightness of the Display
- Changing the Pulse Beep Volume
- Changing the Alarm Limits

Silencing Alarm and Alert Tones

The alarm and alert tones can be silenced for two minutes or indefinitely (until canceled or until the monitor is turned off).

1. To silence the alarm and alert tones for two minutes, momentarily press the alarm silence key. If alarm and alert tones were already silenced, you must press the alarm silence key again. The alarm silenced indicator flashes during the two-minute time-out.

2. To silence the alarm and alert tones indefinitely, press and hold the alarm silence key for about three seconds. The alarm silenced indicator lights steady while alarms are silenced indefinitely.

3. To cancel either the indefinite or the two-minute alarm and alert tone silenced condition, momentarily press alarm silence key; the alarm silenced indicator turns off.

Changing the Alarm and Alert Tone Volume

The alarm and alert tones sound at one of two volumes: soft or loud.

To change between soft and loud volume, press the ALARM VOL key.

Changing the Brightness of the Display

⚠ **WARNING! Adjusting the display too dim may cause the display to be difficult to read in bright light. Make sure the display is bright enough to be seen under all light conditions.**

Use the ▲ or ▼ keys to change the brightness of the display:

- To increase the brightness of the display, press the ▲ key.
- To decrease the brightness of the display, press the ▼ key.

Changing the Pulse Beep Volume

A "beep" tone sounds with each pulse beat. The volume of the "beep" can be positioned to three settings: soft, loud, and off. To adjust the volume to the 'off' setting, push the PULSE VOL key once. From the 'off' setting, set the volume to 'soft' by pressing the key once, or press the key twice in quick succession to set the volume to 'loud'.

Changing the Alarm Limits

Each measurement, SpO_2 and Rate, has a high and low alarm limit setting.

Press the ALARM SEL key until the alarm limit you want to change is shown, then press the ▲ or ▼ key to increase or decrease the setting.

ALARM SEL KEY PRESS	DISPLAY	ALARM LIMIT
First press.	--- HI	--- = High SpO_2 alarm limit. (Example only.)
Second press.	85 Lo	85 = Low SpO_2 alarm limit. (Example only.)
Third press.	HI 155	155 = High pulse rate alarm limit. (Example only.)
Fourth press.	Lo 50	50 = Low pulse rate alarm limit. (Example only.)
Fifth press.	97 74	97 = SpO_2 measurement. (Example only.) 74 = Pulse rate measurement. (Example only.)

NOTE! " – – – " in the display means the limit is set to off.

NOTE! Alarm limits are non-overlapping. You cannot set the high alarm equal to or lower than the low alarm and you cannot set the low alarm equal to or higher than the high alarm.

NOTE! While setting alarm limits, if no keys are pressed for twenty seconds, the alarm limit setting mode is exited and the SpO_2 and pulse rate measurements are shown.

NOTE! Alarms are not active while setting alarm limits; however, alarms are active as soon as you exit the alarm limit setting mode.

NOTE! The low SpO_2 alarm limit minimum test value is 80. If an operator changes the low SpO_2 alarm limit to a value less than 80, and a power down - power up sequence takes place, a minimum value of 85 takes the place of the operator entered value.

Chapter 6: Patient Numbers & Trend Data

This chapter is divided into the following sections:

- Description
- Manually Incrementing the Patient Number
- Viewing Trend Data
- Clearing Trend Data

Description

Whenever the monitor is on, it stores one SpO_2 and one pulse rate reading every thirty (30) seconds. The stored readings are called *trend* data. The monitor remembers trend data for up to 99 patients and 24 hours of run-time.

Trend data is saved for each patient number. When you turn on the monitor, the patient number is automatically incremented and displayed during the power-up sequence if valid trend data was collected from the previous patient. If no valid trend data was collected from the previous patient, the patient number is displayed only and is not incremented. The monitor remembers all the trend data and all the patient numbers for up to 99 patients and 24 hours of run-time.

Trend data for any patient can be viewed on the monitor. Trend data for all patients can be printed on the optional printer.

NOTE! See *Printer* section for information on printing trend data.

Manually Incrementing the Patient Number

1. The SpO_2 probe must be connected to the monitor. If the SpO_2 probe is not connected to the monitor, connect the SpO_2 probe.

2. Press the I.D./CLEAR key to increment the patient number. The new patient number is momentarily displayed and trend data for the new patient is automatically saved.

Viewing Trend Data

1. The SpO_2 probe must be disconnected from the monitor. If necessary, disconnect the SpO_2 probe from the monitor.

2. Press the I.D./CLEAR key; the following sequence occurs:

   a. The middle two pulse bars flash., indicating the monitor is in "trend view" mode. The two pulse bars continue to flash until the mode is exited.

   b. The current patient number is shown for a few seconds.

   c. The last valid data for the corresponding patient number is shown in the SpO_2 and pulse rate displays. If no valid data was collected, "– – –" is shown.

   d. Pressing the ▲ or ▼ keys will increase or decrease the patient number; the patient number will be shown for a few seconds then the last valid data corresponding to the patient number will be shown.

   e. To exit the "trend view" mode, press the I.D./CLEAR key.

NOTE! If no keys are pressed for 20 seconds, the monitor automatically exits the "trend view" mode.

Clearing Trend Data

1. The SpO_2 probe must be connected to the monitor. If necessary, connect the SpO_2 probe to the monitor.

2. Press and hold the I.D /CLEAR key for about six seconds. While you are holding the I.D./CLEAR key, the message CLr flashes on the display to tell you the trend data for all patients is about to be cleared. When the trend data is cleared, the display shows P 1.

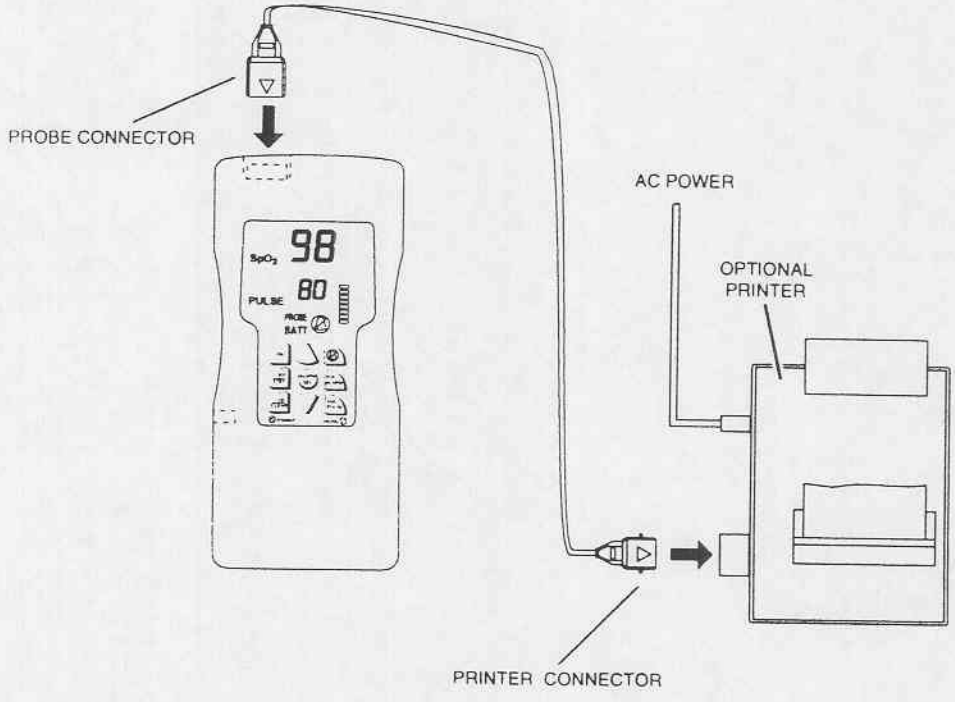
Chapter 7: Printer

This chapter is divided into the following sections:

- Description
- Compatible Printers
- What You'll Need for Printing
- Setting Up the Monitor and the Printer
- Trend Printouts

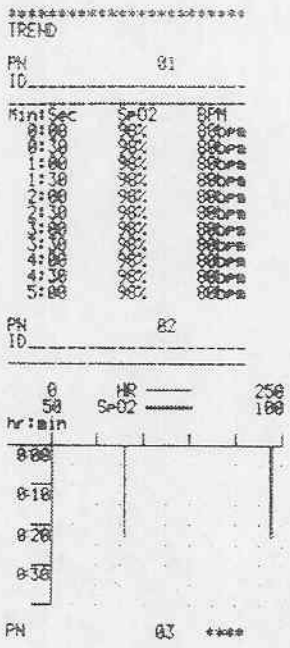
Description

Figure 7.1: Setting Up the Oximeter and the Printer



Data can be printed in trend data mode. In this mode up to 24 hours of previously stored data, collected from 1 to 99 patients, is printed.

Figure 7.2: Sample Trend Printout



Whenever the monitor is on, it stores one SpO_2 and pulse rate reading every thirty (30) seconds.

- If less than 15 minutes of data is collected for one patient, the trend data is printed in a tabular format if 123 mode is selected.
- If more than 15 minutes of data is collected for one patient, the trend data is printed in a graphic format if LLL mode is selected.

The monitor remembers trend data for up to 99 patients and 24 hours of run-time. The trend data can be printed at any time on the optional printer.

Selecting Print Mode For Trend Data

1. Keep ALARM SELECT key pressed for 5 seconds. 123 or LLL appears in the SpO_2 display.

   123 = numerical print-out

   LLL = graphic print-out (only possible with Seiko DPU 201 GSU or Seiko DFU 411 S printers).

2. Select mode with arrow key. The selection remains stored and will apply when the monitor is next switched on.
3. To return to measurement press ALARM SELECT key once.

If a key is not pressed within 20 seconds, the monitor automatically returns to measurement.

Compatible Printers

Printer requirements:

FUNCTION	SPECIFICATION
I/O Port	Serial RS-232C
Data Type	ASCII
Data Format	9600 baud, 1 start bit, 8 data bits, 1 stop bit, no parity
I/O Connector	Standard DB-9
Graphics Interface	Seiko Printer Graphics Interface

Compatible Printers:

MANUFACTURER	MODEL NUMBER
Seiko	DPU-201GSU
Seiko	DPU-411-21BU (120 V 60 Hz) DPU-411-21BE (220 V 50 Hz) NOTE: A DB-9 to DB-25 pin adapter will be required.

For information on printers and printer accessories, contact your authorized sales representative.

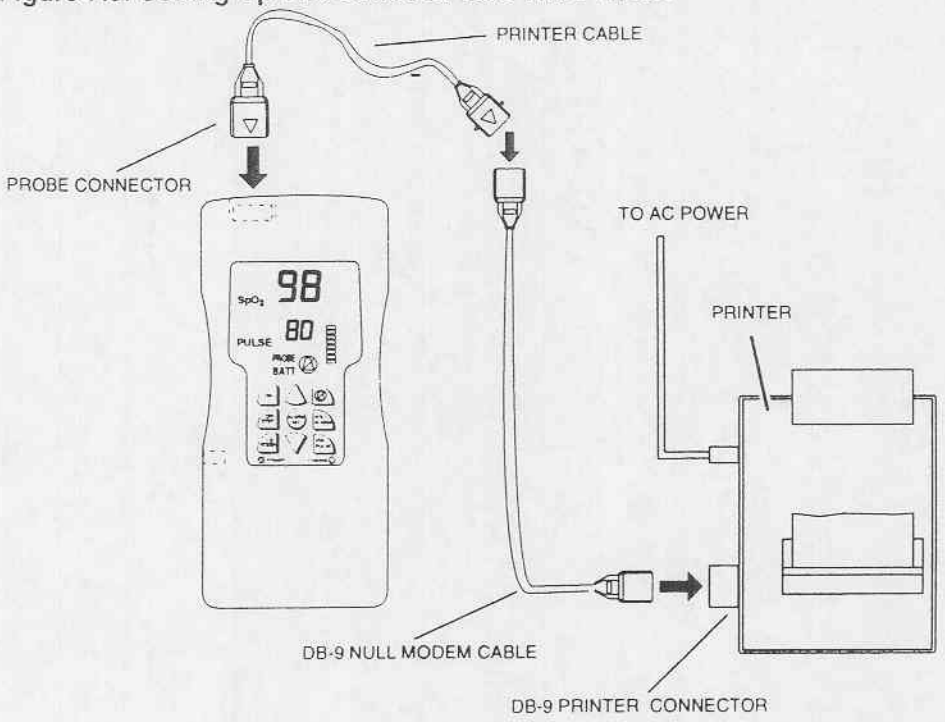
What You'll Need for Printing

You'll need these items to print trend printouts:

- Oximeter
- Printer Cable (see the *Optional Supplies and Accessories* section for ordering information).
- Compatible printer (purchased from one of the printer manufacturer's distributors).
- Accessories required for the printer, such as paper, power supply or charger, and so on (purchased from the printer manufacturer's distributor).

Setting Up the Monitor and the Printer

Figure 7.3: Setting Up The Oximeter And The Printer.



1. Refer to the printer's operation manual and make sure the printer's RS-232 data format is set up as follows:

    - Data Type: ASCII
    - Data Format: 9600 baud, 1 start bit, 8 data bits, 1 stop bit, no parity

2. Connect the printer adapter's connector to the probe connector.

3. Connect the printer adapter's DB-9 connector to the mating connector on the printer. (If necessary, connect the printer adapter's DB-9 connector to a DB-9 to DB-25 adapter, then connect the adapter to the printer.)

4. Connect the printer's power source to the printer as described in the printer's operation manual.

⚠ **CAUTION! Use only the printer cable specifically intended for use with this device (see *Optional Supplies and Accessories*).**

5. Make sure the printer has paper loaded and is ready to print as described in the printer's operation manual.

Trend Printouts

Collecting Trend Data

Whenever the monitor is on, it stores one SpO_2 and one pulse rate reading every thirty (30) seconds. The stored readings are called *trend* data. The monitor remembers trend data for up to 99 patients and 24 hours of run-time. The trend data can then be printed at any time on the optional printer.

Trend data is saved for each patient number. When you turn on the monitor, the patient number is automatically incremented and displayed during the power-up sequence if valid trend data was collected from the previous patient. If no valid trend data was collected from the previous patient, the patient number is displayed only and is not incremented. The monitor remembers all the trend data and all the patient numbers for up to 99 patients and 24 hours of run-time.

Manually Incrementing the Patient Number

1. The SpO_2 probe must be connected to the monitor. If necessary, connect the SpO_2 probe to the monitor.

2. Press the I.D./CLEAR key to increment the patient number. The new patient number is momentarily displayed and trend data for the new patient is automatically saved.

Clearing Trend Data

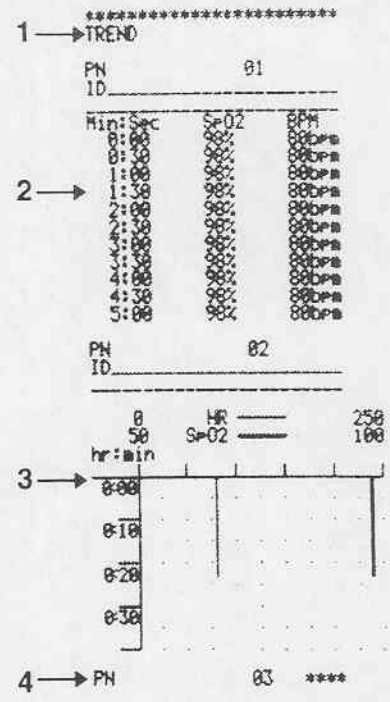
1. The SpO_2 probe must be connected to the monitor. If necessary, connect the SpO_2 probe to the monitor.

2. Press and hold the I.D./CLEAR key for about six seconds. While you are holding the I.D./CLEAR key, the message Clr flashes on the display to tell you the trend data for all patients is about to be cleared. When the trend data is cleared, the display shows P 1.

Printing Trend Data

1. Set up the monitor and printer as previously described.
2. Disconnect the SpO_2 probe from the monitor.
3. Connect the printer cable to the monitor.
4. Turn on the printer.
5. Turn on the monitor. The monitor prints the trend data for each patient, from patients 1-99, as shown in the sample printout.
6. If there is no trend data at all, the message "*******" is printed.
7. If no valid data is collected for a patient number, "****" is printed.
8. If valid data is collected for a patient number for less than one minute, only the last measurement is printed.
9. If data is collected for a patient number for more than one minute, the relative time since the first measurement is shown for that patient.

Figure 7.4: Printing Trend Data



1. Monitor is turned on with SpO_2 probe disconnected from monitor; the trend printout is started.
2. The trend printout shows the relative time since the first measurement for that patient number.
3. More than 15 minutes of trend data was collected (in LLL mode) for patient 02; the trend data is printed in a graphic format.
4. No valid data was collected from patient number 03; **** is printed.

10. Dashes indicate invalid or unavailable data (for example, the patient's finger was removed from the SpO_2 probe).
11. If you press the I.D./CLEAR key while printing trend data, the trend printout stops. Pressing the I.D./CLEAR key also increments the patient number, and trend data is collected for the new patient number.

NOTE! If unexpected characters or question marks are printed, turn the printer off and on to reset the printer.

Chapter 8: Operating Modes

This chapter is divided into the following sections:

- About the Monitor's Operating Modes
- Setting Up the Monitor for Home-Use
- Equipment and Supplies Checklist for Home-Use
- Training the Home-Use Caregiver
- Turning Off the Home-Use Mode
- Setting Up the Sleep Study Mode
- Turning Off the Sleep Study Mode
- PC Communication Setup

About the Monitor's Operating Modes

The monitor has three operating modes: clinician mode (previously described), home-use mode and sleep study mode.

- The clinician mode is intended for health-care professionals trained in monitoring respiratory and cardiovascular activity.
- The home-use mode is intended for caregivers trained in oximeter use by a doctor or other health-care professional.
- The sleep study mode is intended for health-care professionals trained in monitoring respiratory and cardiovascular activity.

While the monitor is in the clinician mode, all monitor functions operate as described previously in this manual.

NOTE! Accessing Home Use Mode and Sleep Study Mode may only be done from the Clinician Mode. It is not possible to access Home Use Mode from Sleep Study Mode or vice versa.

Home Use Mode

While the monitor is in home-use mode:

- Alarm limits can be viewed but cannot be changed.
- The alarm and alert tone is set to loud and cannot be changed.
- Alarm and alert tones can be silenced for two minutes but cannot be silenced indefinitely.
- SpO_2 averaging is set to 8 beats; pulse rate averaging is set to 8 seconds.
- Patient numbers and trend view are disabled.
- Trend data is collected for one patient.
- Trend data from the patient can be printed. The printout is the same as during clinician mode, except "Home Mode" replaces "Patient Number" on the printout.
- All other functions of the monitor work as in clinician mode.

Setting Up the Monitor for Home-Use

1. Set the high and low alarm limits for SpO_2 and pulse rate to the values prescribed by the doctor:

   - High SpO_2 alarm limit.
   - Low SpO_2 alarm limit.
   - High pulse rate alarm limit.
   - Low pulse rate alarm limit.

2. Clear trend data if necessary. (Press and hold I.D./CLEAR until P1 is displayed.)

3. Put the monitor into the home-use mode as follows (Make sure that the monitor is in Clinician Mode prior to executing the following commands!):

   a. Turn off the monitor.

   b. Press and hold the ALARM VOL key, then press the ON key.

   c. While holding the ALARM VOL key, **H** flashes in the pulse rate display.

   d. When **H** stops flashing and lights steady (in about 6 seconds), release the ALARM VOL key. The monitor is now in home-use mode.

4. Verify the monitor is in the home-use mode:

   a. Turn off the monitor.

   b. Turn on the monitor while observing the display; **H** should be shown briefly when the monitor is turned on. If not, repeat step 3 above.

5. Verify the high and low alarm limits for SpO_2 and pulse rate are set to the values prescribed by the doctor. (Press ALARM SEL to show each of the alarm limits one-at-a-time.)

6. Turn off the monitor.

Equipment and Supplies Checklist for Home-Use

Provide the following to the home-use caregiver:

QUANTITY	CAT. NO.	DESCRIPTION
1	3303	Oximeter
1	8210	AC Adapter
1	3353	Protective rubber boot with carrying case
*	3049	Adhesive Strips (Adhesive Tape)
1	1854	Home-Use Instruction Book
* Quantity prescribed by doctor.		

The doctor will prescribe the type and quantity of the probes needed for home-use:

QUANTITY	CAT. NO.	DESCRIPTION
*	3044	Probe, Reusable, Finger
1	3311	Cable, Oximetry, 5 Feet
*	1300	Probe, Disposable, Adult
*	1301	Probe, Disposable, Pediatric
*	1302	Probe, Disposable, Neonate
*	1303	Probe, Disposable, Infant
* Quantity prescribed by doctor.		

The home-use caregiver will also need these supplies and reference materials:

QUANTITY	DESCRIPTION
1	Scissors (for trimming adhesive strips or adhesive tape).
*	Isopropyl alcohol and a soft, clean cloth (or alcohol wipes) for disinfecting monitor and reusable probe.
1	Written instructions on how to respond to the monitor's alarms.
1	Emergency phone numbers for the doctor.
1	Emergency phone number for the hospital emergency room.
1	Emergency phone number for local paramedics or police.
1	Phone number for equipment supplier in case the equipment fails.
* Quantity prescribed by doctor.	

Training the Home-Use Caregiver

1. The home-use caregiver must be trained in CPR.
2. Make sure the monitor's alarm limits are properly set and that the monitor is in the home-use mode.
3. Inform the caregiver that the oximeter is not to be used as an apnea monitor.
4. (Following the Home-Use Instruction Book while teaching these tasks may help you and the caregiver.) Show the home-use caregiver how to:
   - Connect the AC power supply to the monitor.
   - Interpret the POWER and CHARGING lights.
   - Visually inspect the probe and oximetry cable.
   - Connect the probe to the oximetry cable.
   - Connect the oximetry cable to the monitor.
   - Turn on the monitor.
   - Route the cable safely from the patient to the monitor to prevent possible patient strangulation.
   - Attach the probe(s) prescribed by the doctor.
   - Measure the SpO_2, pulse rate, and pulse strength bar graph readings.
   - Change the brightness of the display.
   - Change the pulse beep volume.
   - Turn off the alarm and alert tones for two minutes.
   - Turn on the alarm and alert tones.
   - Interpret the alarms.
   - View the alarm limits.
   - Interpret the PROBE alert.
   - Interpret the BATT attention.
   - Turn off the monitor.

5. Tell the caregiver how to respond:

   - In case of a patient emergency, including what therapy to provide the patient.
   - In case an alarm sounds, including what therapy to provide the patient.
   - In case the probe alert sounds.
   - In case the batt attention sounds.
   - In case the caregiver has trouble operating the equipment.

Turning Off Home-Use Mode

1. Turn off the home-use mode (put the monitor into the clinician mode) as follows:

   a. Turn off the monitor.

   b. Press and hold the PULSE VOL key, then press the ON key.

   c. While holding the PULSE VOL key, H flashes in the pulse rate display.

   d. When H stops flashing, and patient number Pn (n = patient number) lights steady, (in about 6 seconds), release the key. The monitor is now in clinician mode.

2. Verify the monitor is in the clinician mode:

   a. Turn off the monitor.

   b. Turn on the monitor while observing the display; the software revision then the patient number should be displayed during power-up. If not, repeat step 1 above.

Sleep Study Mode

While the monitor is in sleep study mode:

- Patient numbers and trend view are disabled.
- A new trend block is started each time the monitor is turned on.
- Trend data from the patient is stored and may then be output to a PC.
- Following the header, the SpO_2 and pulse rate trend block is output in ASCII as follows:

  ****
  Sleep Study

  SpO_2, Pulse
  97 67
  98 69
  98 71
  98 71
  ****
  Sleep Study

  SpO_2, Pulse
  97 67
  98 69
  98 71
  98 71

  Each pair of data points represents a four second block of data. For each trend block, the header "Sleep Study" appears preceding the trend block, indicating that a break has occurred in the data.

- Trend data from the patient is stored every four seconds. The SpO_2 data consists of a minimum display value over the four second interval. Refer to the *Turning on the Monitor* section for information on SpO_2 and pulse rate display values (specifically "averaging"). Since patient ID numbers are disabled in sleep study mode, the trend printout will have the header "Sleep Study" (as shown above) for each patient block. New patient blocks may only be accessed when the unit is turned off, then on.
- When trend memory is full (i.e. after approximately 12 hours of operation), the data storage will begin at the start of memory, thereby overwriting the oldest data (the most recent data is always retained).

- The serial communication setup is the same as in the clinician mode (9600 baud, 1 start bit, 8 data bits, 1 stop bit, no parity).
- All other functions of the monitor work as in the clinician mode.

Setting Up the Monitor for Sleep Study Mode

NOTE: When entering or exiting Sleep Study mode previous memory will be lost.

1. Put the monitor into the sleep study mode as follows (Make sure that the monitor is in Clinician Mode prior to executing the following commands!):

   a. Turn off the monitor.

   b. Press and hold the ALARM SEL key, then press the ON key.

   c. While holding the ALARM SEL key, SLP flashes in the pulse rate display.

   d. When SLP stops flashing and lights steady (in about 6 seconds), release the ALARM SEL key. The monitor is now in sleep study mode.

2. Verify the monitor is in the sleep study mode:

   a. Turn off the monitor.

   b. Turn on the monitor while observing the display; SLP should be shown briefly when the monitor is turned on. If not, repeat step 1 above.

Turning Off Sleep Study Mode

1. Turn off the sleep study mode (put the monitor into the clinician mode) as follows:

   a. Turn off the monitor.

   b. Press and hold the ALARM SILENCE key, then press the ON key.

c. While holding the ALARM SILENCE key, SLP flashes in the pulse rate display.

d. When SLP stops flashing, and patient number Pn (n = patient number) lights steady, (in about 6 seconds), release the key. The monitor is now in clinician mode.

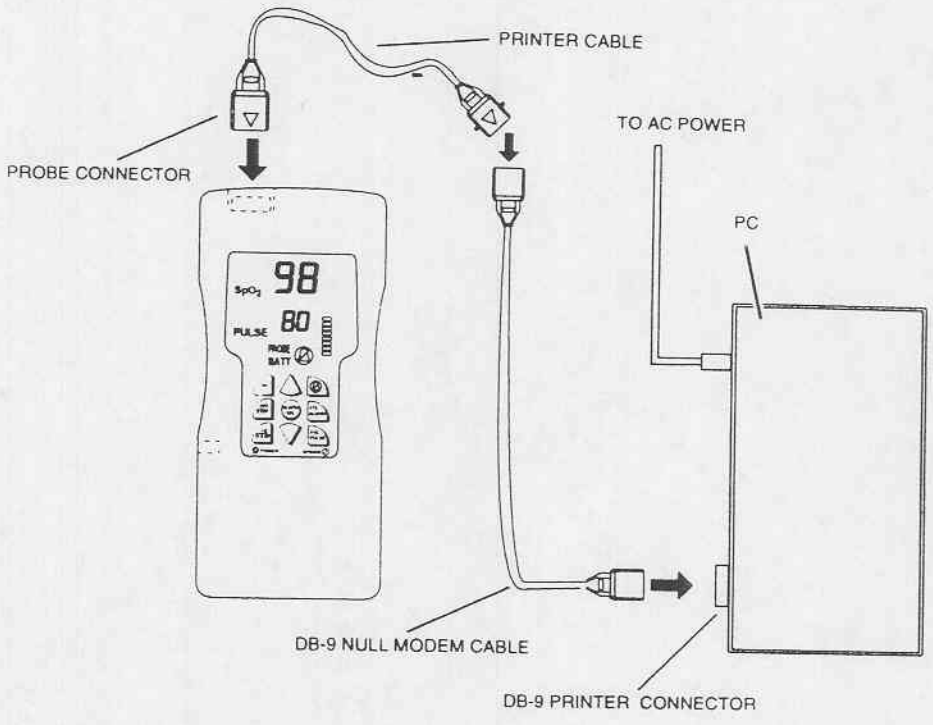
2. Verify the monitor is in the clinician mode:

   a. Turn off the monitor.

   b. Turn on the monitor while observing the display; the software revision then the patient number should be displayed during power-up. If not, repeat step 1 above.

PC Communication Setup

Figure 8.1: Setting Up The Oximeter And The PC.



1. Power up the monitor.

2. Connect the printer communication cable to the monitor.

3. Set up the communication software to accept the following RS-232 data format :

- Data Type: ASCII
- Data Format: 9600 baud, 1 start bit, 8 data bits, 1 stop bit, no parity

4. Connect the standard RS232 null modem cable's DB-9 connector to the mating connector of the printer cable.

5. Connect the standard RS232 null modem cable's DB connector to the mating connector on the PC.

NOTE! The modem cable is an industry standard RS232 modem cable.

Transferring Sleep Study Data to a PC

1. Set up the monitor, cables, and PC as previously described.

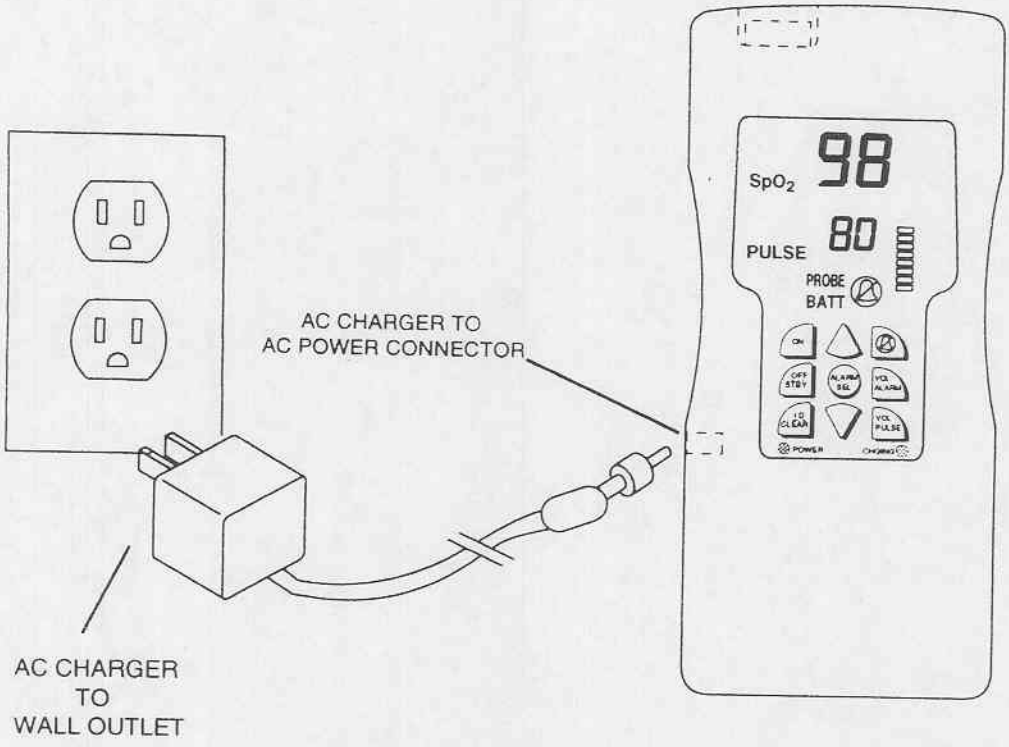
2. Turn on the PC and load the communication software, setting the serial communication defaults as previously described.

3. Turn on the monitor.

4. Dashes indicate invalid or unavailable data (for example, the patient's finger was removed from the SpO_2 probe).

Chapter 9: Charging the Monitor

Figure 9.1: Connecting AC Power.



1. Connect the AC charger as shown.

2. Make sure the POWER indicator lights up on the charger. If not, see the *Troubleshooting* section.

3. CHGING indicator lights while the monitor's battery is charging.

4. Device is fully charged when the CHGING light turns off.

5. The monitor's battery will fully charge in about four 4 hours (NiCad) or 6 hours (NiMH). A fully charged battery provides approximately 12 hours (NiCad) or 24 hours (NiMH) of use.

6. The device may be operated while charging.

Chapter 10: Maintenance

This chapter is divided into the following sections:

- Schedule of Maintenance
- Correcting the PROBE Alert

Schedule of Maintenance

MAINTAIN THIS ITEM:	HOW OFTEN:	BY DOING THIS:	PAGE:
Battery.	When BATT is flashing, or after the monitor has been used under battery power.	Follow the instructions for charging the monitor.	9-1
Repositioning the probe.	At least once every 4 hours.	Follow the instructions for attaching the probe.	4-8 to 4-14
Disinfecting the #3044 reusable probe.	Before attaching the probe to the patient.	Follow the instructions for attaching the #3044 reusable probe.	4-8
Disinfecting the monitor and the AC power supply.	When necessary.	1. Disconnect the monitor from the AC power supply. 2. Disconnect the AC power supply from the wall outlet and from the monitor. 3. Wipe the surfaces of the monitor and the AC power supply with a soft, clean cloth dampened in isopropyl alcohol. Use only a cloth that is dampened, not wet. ⚠ **CAUTION! Do not allow isopropyl alcohol to enter any of the openings on the monitor.**	

Correcting the PROBE Alert

Follow these steps to correct the probe alert:

1. Make sure the probe's connector is firmly seated in the monitor's connector.

2. Make sure the probe is properly attached to the patient. See *Attaching the Probe to the Patient* section for help.

3. Make sure the adhesive tape used to hold the probe is not wrapped too tightly. Wrapping the tape too tightly may prevent the monitor from measuring the SpO_2 and pulse rate.

4. If the probe alert is still on, contact your doctor or the equipment dealer for help.

Chapter 11: Troubleshooting

PROBLEM:	POSSIBLE CAUSE / SOLUTION:	PAGE
PROBE alert.	1. Probe may not be properly connected to monitor. Make sure probe connector is firmly seated in monitor connector. 2. Probe may not be properly attached to patient. See *Attaching the Probe to the Patient.* 3. Adhesive tape may be too tight on patient. Loosen adhesive tape. 4. Probe, interface cable, or monitor may be defective. Contact authorized repair center for help.	4-4 4-2
BATT attention.	Monitor's battery has become weak from use. See *Charging the Monitor:*	9-1
SpO_2, pulse rate, or pulse bar graph not shown on monitor. *or* Pulse rate value erratic, intermittent, or incorrect. *or* SpO_2 value erratic, intermittent, or incorrect.	1. Patient may be moving. Have patient remain as still as possible. 2. Connectors from probe to monitor may not be firmly seated. Make sure all connectors between probe and monitor are firmly seated. 3. Probe may not be properly attached to patient. See *Attaching the Probe to the Patient.* 4. Adhesive tape may be too tight on patient. Loosen adhesive tape. 5. Probe, interface cable, or monitor may be defective. Contact authorized repair center for help.	4-4 4-2
Monitor does not turn on when ON key is pressed.	1. Battery needs charging. See *Charging the Monitor.* 2. Monitor may be defective. Contact authorized repair center for help.	9-1
Monitor turns off suddenly.	Battery needs charging. See *Charging the Monitor.*	9-1

PROBLEM:	POSSIBLE CAUSE / SOLUTION:	PAGE
POWER indicator does not light when AC power supply is attached	1. Make sure the AC power supply is firmly connected to the wall outlet and to the monitor. 2. Make sure the wall outlet is not controlled by a switch. 3. Make sure AC power is available at the wall outlet. (Plug a lamp or a radio into the same wall outlet and see if the lamp or radio turns on.) 4. AC power supply or monitor may be defective. Contact authorized repair center for help.	9-1
CHGING does not light on the monitor.	1. Monitor's battery may be charged.	
No printout on optional printer.	1. Printer power not connected, or printer power switch is off. Make sure the power is connected to the printer and the printer power switch is on. 2. Printer interface connectors not firmly seated. Make sure printer interface cables are firmly seated. 3. Insure that the proper communication protocol has been selected for the printer. 4. Printer or monitor may be defective. Contact authorized repair center for help.	7-4

Chapter 12: Optional Supplies & Accessories

CAT. NO.	DESCRIPTION	QTY.
1300	Probe, Oximetry, Disp., Adult Finger	10/box
1301	Probe, Oximetry, Disp., Ped. Finger, 15-45 Kg	10/box
1302	Probe, Oximetry, Disp., Neonate, < 3 Kg	10/box
1303	Probe, Oximetry, Disp., Infant, 3-15 Kg	10/box
1606	Simulator	each
1850	Manual, Clinician's Operation (3303)	each
1851	Manual, Service (3303)	each
1854	Manual, Home Use Instruction Book (3303)	each
3025	Probe, Oximetry, Wrap, Infant, 3-15 Kg	each
3026	Probe, Oximetry, Wrap, Neonate, < 3 Kg	each
3043	Probe, Oximetry, Universal "Y"	each
3044	Probe, Oximetry, Finger	each
3049	Strips, Adhesive	40/pkg.
3078	Probe, Oximetry, Ear	each
3134	Tape, Attachment, Neonatal	50/pkg.
3135	Tape, Attachment, Infant	50/pkg.
3136	Tape, Attachment, Neonatal	100/pkg.
3137	Tape, Attachment, Infant	100/pkg.
3138	Posey Wrap, Attachment, Universal "Y"	10/pkg.
3143	Attachment, OxiLink small finger	100/ctn
3144	Attachment, OxiLink medium finger	100/ctn
3145	Attachment, OxiLink large finger	100/ctn
3311	Cable, Oximetry, 5 ft.	each
3350	Printer Cable (for #3303)	each
3353	Protective rubber boot with carrying strap	each
3354	Pole Mount Bracket	each

Ordering Information:

For ordering information, contact the customer service department at the address or phone number below:

BCI International
N7 W22025 Johnson Road
Waukesha, WI 53186-1856

Phone: (414) 542-3100
Toll-Free: (800) 558-2345
Fax: (414) 542-0718

email: bciintl@execpc.com

Chapter 13: Specifications

Oximeter

Parameters Monitored	SpO_2 Pulse Rate Pulse Strength	
Displays, Indicators, & Keys	SpO_2	3-digit LED display, 0.43 inches (10.9 mm) high.
	Pulse Rate	3-digit LED display, 0.375 inches (9.5 mm) high.
	Pulse Strength	Logarithmically scaled 8-segment LED bar graph.
	PROBE	Probe alert indicator.
	BATT	Low battery indicator.
	Silenced	Alarm and alert tone silenced indicator.
	Keys	Nine control keys provided.
	Brightness	Adjustable brightness of SpO_2, pulse rate, and bar graph displays.
Indicators	POWER	Indicates oximeter connected to AC power.
	CHGING	Indicates oximeter battery is charging.
SpO_2	Range	0-100%
	Accuracy	±2% at 70-100% ±3% at 50-69%
	Alarm Limits	High 100-50% and off in 1% steps. Low 50-99% and off in 1% steps.
	Averaging	4, 8, or 16 pulse beat average.

Pulse Rate	Range	30-254 BPM
	Accuracy	±2% at 30-254 BPM
	Alarm Limits	High 250-5 BPM and off in 5 BPM steps. Low 5-250 BPM and off in 5 BPM steps.
	Averaging	8 or 16 second average.
Alarm Indicators	Two-tone audible alarm with user-adjustable volume and two-minute or indefinite alarm silence. Corresponding numeric display flashes.	
Probe Alert Indicator	Single-tone audible alarm with same volume and silence as alarm tone.	
Printer Output	Data saved every thirty (30) seconds can be printed (trend).	
Battery	Type	Internal rechargeable Nicad or NiMH; not user replaceable.
	Charge Time	Nicad: Fully charges in about 4 hours. NiMH: Fully charges in about 6 hours.
	Use Time	Approximate continuous use: 12 hours (Nicad) 24 hours (NiMH).
	Indicators	BATT indicator lights when about 30 minutes of battery use remains.
AC Charger	Wall Mount Style	Input of 105-125 V~ , 60Hz Input of 100V~, 50Hz (Optional)
	Table Top Style	Input of 230 V~ , 50/60Hz
Dimensions	Width	3.3 inches (84 mm)
	Height	7.25 inches (184 mm)
	Depth	1.85 inches (47 mm)
	Weight	19 ounces (539 grams) including battery
Environmental Specifications	Temperature	Operating:-20-55° C (-4-131° F) Storage: -40-75° C (-40-167° F)
	Relative Humidity	Operating: 15-95%, non-condensing Storage: 10-90%, non-condensing

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